



US DEPARTMENT OF DEFENSE

BLAST INJURY RESEARCH PROGRAM COORDINATING OFFICE

Wound Infection Mitigation

Nano-fibrous Bioactive Wound Dressing

BUMED is sponsoring a research project developing an electrospun biomimetic bioactive wound healing dressing comprised of a nano-fibrous scaffold based on extracellular matrix morphology and composition. This innovative wound dressing could be used to as a physical barrier to keep wounds free of debris while actively improving the healing process. To fabricate this dressing, a nano-fibrous polymeric scaffold capable of sustained release of platelet-derived growth factor (PDGF) will be created. Bioactive PDGF stimulates chemotaxis, proliferation, and new gene expression in neutrophils, monocytes, macrophages, and fibroblasts, which are cell types that are essential for tissue repair. PDGF also inhibits the differentiation of fibroblasts into myofibroblasts, which may reduce scar formation. The development of this wound dressing could significantly improve wound healing rates and reduce operative trauma and complications. In FY14, NAMRU-SA successfully fabricated two composite nano-fibrous scaffolds containing Chitosan, Polyethylene oxide, and Fibrinogen. The scaffolds have an average fiber diameter < 500 nm, and have shown good antimicrobial properties. Additionally, the scaffolds demonstrated multi-phase degradation profiles, which make these scaffolds a prime candidate for loading PDGF. Studies are on-going to incorporate the growth factor into these composite scaffolds.